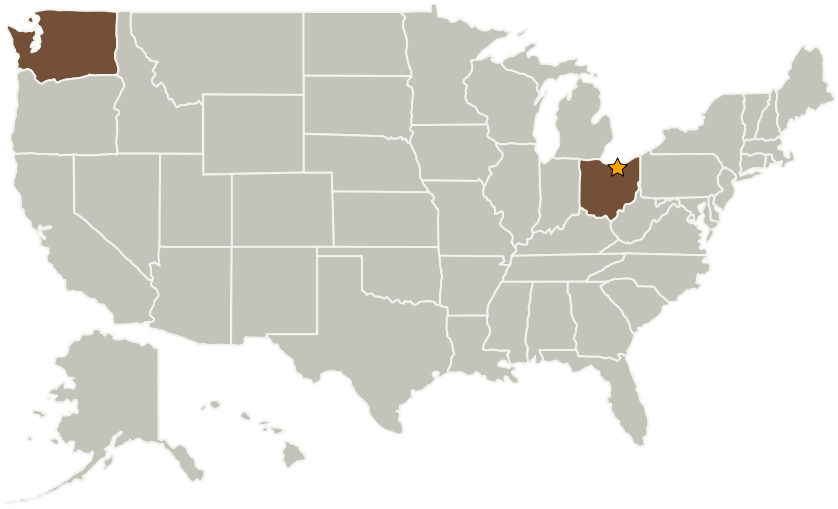
High Power Helicon Plasma Propulsion, Phase II

Completed Technology Project (2005 - 2007)

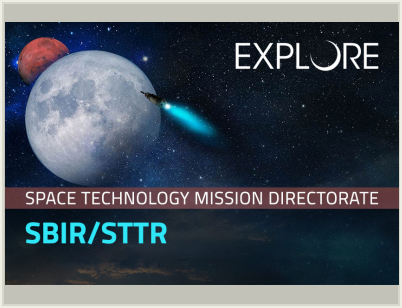
Project Introduction

A new thruster has been conceived and tested that is based on a high power helicon (HPH) plasma wave. In this new method of propulsion, an antenna generates and propagates a helicon wave in a plasma providing a non-thermal, wave-based mechanism for the subsequent acceleration of the plasma ions to high Mach number. The propellant is ionized and accelerated by the wave fields far from the thruster wall that results in an electrode-less plasma propulsion system. The device is small, light-weight, and structurally simple. It can operate with essentially any propellant, with efficiencies comparable to Hall and Ion thrusters. Phase I results indicate that HPH based thruster will make an efficient propulsion system with an estimated thrust of about 1 N for 50 kWe at an Isp of 2000 s in Argon, with higher Isp in Helium and Hydrogen. Higher thrust and Isp levels are expected with further optimization of its operational characteristics. The RF power system is also low mass and highly efficient. Operation with variable duty cycle allows for power delivery from 5 to 50 kW.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
MSNW Inc	Supporting Organization	Industry	Bellevue, Washington



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Ohio	Washington

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic